Message Order and Culture:

The Relationship between Cognitive Thinking Styles,

Response Mode and Order Effects

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Previous research has documented the prevalent effects of message order on message persuasiveness. Based on the Belief Updating Model (Hogarth and Einhorn, 1992), response mode has been found as one moderator of primacy versus recency effects. The present study considers additionally the role of culture as a moderator. Because internalized cultural values and norms affect how messages are processed and interpreted, we propose that cultural differences in cognitive processing styles will impact whether primacy or recency effects are stronger under different message order conditions in for Easterners and Westerners. Results from the current work offer evidence that both culture and cognitive style (holistic versus analytical thinking) serve as moderators to explain message order effects. Results replicate prior studies showing a primacy effect with End of Sequence response mode and a recency effect with Step-by-Step response mode. Further, we found that Easterners were more influenced by the primacy effect when compared to Westerners. However, the effect of primacy was attenuated by response mode. Westerners were equally influenced by both primacy and recency effects.

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To my God, my dearest family and friends

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INTRODUCTION

When we try to influence another's opinion on an issue, we must gather convincing evidence to form persuasive arguments. Considering that most issues we encounter in our everyday life involve multiple perspectives, within a persuasive message, information on the different perspectives is usually presented one piece after another in a sequential manner. These perspectives can involve messages supporting or opposing an opinion, and whenever messages appear in sequence, the message receiver's judgments may be susceptible to order effects. Such effects of order hold powerful implications as it suggest that we can intensify the persuasiveness of our messages simply by manipulating the order in which they are presented without having to alter the content of the messages. More importantly, the order of presentation is fully within the control of the message presenter because of the freedom to choose which piece of information to present first and which piece of information to present last. Thus, we can utilize this simple yet effortless strategy to maximize the persuasiveness of our messages that will help us obtain desired outcomes. Unfortunately, the order effects are often overlooked precisely because of their simplicity; instead, we focus exclusively on the content of the messages without considering when and where to present key pieces of information. In order to benefit from the effects of order, we must understand the effects of order that will help us determine strategic positions to enhance the persuasiveness of our carefully crafted messages.

While we have complete control over the order in which messages are presented, there is less control in how these arguments are processed by message receivers. More specifically, receivers can form evaluations in different manners depending on their response mode. They can pause to make judgments after every single piece of information has been presented to them, and then subsequently adjust their prior evaluations based on succeeding pieces of information.

Alternatively, they can withhold all judgments until every piece of information has been presented. Specific predictions of order effects have been made based on the Belief Updating Model (Hogarth & Einhorn, 1992). Accordingly, the tendency to use different ways to make evaluations can be induced by the response mode, and also more importantly, it is influenced by the receiver's cognitive style of information processing. Although we do not have control over such style preferences, we can make predictions based on previous results showing robust cultural differences in cognitive styles of thinking. Studies have found that Easterners tend to be more holistic while Westerners tend to be more analytical (Choi, Nisbett, and Norenzayan, 1999; Nisbett et al. 2001; Pen and Nisbett, 1999). Because internalized cultural norms and values influence information processing strategies that differ across cultures, the effects of message order will likely have different persuasive consequences for people from cultures that hold different thinking style preferences.

Past work on message order effects in persuasion has demonstrated numerous factors that explain order effects such as the length of information presented, the relevancy of the topic, and complexity of the arguments. Most accounts for these findings have emphasized "cognitive" explanations, the most obvious one being the amount of attention and elaboration given to an argument (See Eagly & Chaiken, 1993). It remains to be shown whether cultural differences in cognition will also impact the effects of message order that are related to thinking and processing styles. Under what conditions does information processed early/later in the sequence have greater/lesser influence using different styles of cognitive processing? Thus, the purpose of the current study is to examine culture and thinking styles as moderators that explain the occurrences of the primacy effect, (i.e., responding more strongly to information presented first), versus the recency effect, (i.e., responding more strongly to information presented last). By adapting the

three-stage model of Belief-Adjustment, we offer specific predictions on how culture can affect all three stages in the model when engaging in information processing. We test our hypotheses in in a series of two studies. In the first study, we examine the effect of message order by manipulating the order in which information is presented. In study two, we examine additionally the effect of response mode by manipulating the way in which opinions are elicited as well as the order in which they appear.

Our results contribute to the existing body of knowledge on effects of message order with the goal of gaining an understanding of how persuasion variables interact in the development of opinions and attitudes. We extend previous theory on cognitive thinking styles by applying it in a message persuasion context and provide support for the Belief-Adjustment Model (Hogarth & Einhorn, 1992). Findings from the current research shed light on the mechanism through which cognitive processing styles that differ across culture can potentially make people more or less susceptible to order effects. Because people are not always aware of how and why they think in the way they do (Nisbett & Wilson, 1977), our research addresses practical concerns regarding the influence of message order that can extend in variety of areas that involve opinion and attitude change.

Primacy and Recency Effects

Order effects refer to the phenomenon whereby the order in which a variety of stimuli is presented affects participants' responses. The earliest set of studies conducted in this area was by Lund (1925), who first coined the term "law of primacy in persuasion," whereby an individual is more likely to be influenced by information presented at the beginning of a message, and subsequently make final decisions based on the initial impression (Lund, 1925). A series of studies following his work provide ample support for this theory. For example, in the classic

experiment by Asch (1946) on impression management, he demonstrated that the order in which positive and negative personality traits are presented about a fictitious character have a profound influence on an individual's first impression of this character (Asch, 1946). Specifically, in his study, participants were assigned into two different groups, both groups were given adjectives describing an imaginary person, and asked to rate the person being described. One group heard the person described as "intelligent, industrious, and insightful" followed by "critical, stubborn, and envious" personality traits. The comparison group was presented with the same personality traits but with the positive traits presented last and negative traits presented first. Asch found that participants who heard the positive traits first had a much more favourable impression of the imaginary person than those who heard the negative traits first. In other words, participants weighed information presented first more heavily, regardless of whether that information was positive or negative.

Following Asch's initial investigations, many studies have investigated and demonstrated the primacy effect on final judgments in other areas, such as jury decision making (e.g., Lawson, 1968). However, some years after Lund's initial set of studies, Hovland and Mandell (1957) found evidence for recency effects by demonstrating that information presented immediately before a decision is made had greater impact on the final decision than information presented at the beginning. Specifically, the authors found that when a delay between the arguments existed, the recency effect was more prevalent. On the basis of these results, the authors concluded that no universal law of either primacy or recency could be justified by existent empirical findings.

Indeed, evidence for both primacy and recency effects are prevalent in the literature. For example, in the area of personnel decision making, Springbett (1958) found evidence supporting the primacy effect where the first impression of an applicant influenced decision made on

subsequent evaluations. In contrast, Farr (1973) found the evidence for the recency effect when participants gave multiple ratings based on sequentially presented information, and the primacy effect when only one overall rating was made after receiving all the information. Mixed evidence that supports both primacy and recency effects extends to other domains of research such as performance evaluations, consumer behaviours, and sales performance ratings (Aronson & Lerner, 1965; Anderson & Norman, 1965; Buda, R. 2000; Carlson, 1971; Chapman & Gretchen, 1996; Mantonakis & Antonia, 2009; Kerstholt & José, 1998;Wagner & Keith, 2007).

Belief-Adjustment Model

A variety of perspectives has been used to explain the existing set of mixed results in the message order literature. One particular perspective has provided a comprehensive framework known as the Belief-Adjustment Model developed by Hogarth and Einhorn (1992) that links the effects of information complexity, length of information presented, and response mode (the process used to make judgments) to explain findings in the extant message order literature. The authors considered a wide range of tasks including impression formation, probability estimation, assessment of guilt or innocence in mock trials, attribute of performance, estimates of contingencies, and judgments weights using belief-adjustment paradigm. According to the belief-adjustment model, the belief and opinion on a particular hypothesis (s_k) is the result of an anchoring and adjustment process based on the evaluation of *k* pieces of information. A prior opinion on an issue, which is the anchored belief (S_{k-1}), is in turn affected by subjective evaluation of the *k*th piece of information ($s(x_k)$) that is then weighted against a reference point (R). Finally, the magnitude of the influence of ($s(x_k)$) is dependent on the weight assigned to that piece of information (W_k). This model can be represented by the following algebraic equation:

$$S_k = \left(S_{k-1)}\right) + W_k[S(x_k) - R]$$

In particular, this model has demonstrated the ability to predict order effects on decision-making processes (Highhouse & Gallo, 1997; Hogarth & Einhorn, 1992) depending on three factors of the message: 1) the response mode which describes the process of how evaluations are made (e.g. the *step-by-step* (SbS) procedure, where people evaluate each piece of information immediately after it is presented, or the *end-of-sequence* (EoS) procedure, where one overall evaluation is made after all pieces of information have been presented); 2) the task length referring to how much information is presented; and 3) the complexity of the information presented. For the purpose of the present investigation, we focus on the effect of response mode while holding constant the effects of task length and complexity.

This model can be further broken down into 3 important subprocesses: a) *how evidence is encoded* – relative to constant or reference points, b) *how evidence is processed* – whether opinions are formed in response to each piece of evidence or only after all evidence has been processed, and c) *how adjustments are accomplished* – the degree of opinion change. Here we outline each subprocess in detail.

Specifically, in the *encoding* stage, evidence is encoded in one of two manners: either relative to the level of current belief or in an absolute manner. Thus, a distinction is made between *evaluation* and *estimation* tasks. In the evaluation tasks, people encode evidence as positive or negative relative to the hypothesis under consideration such that supporting evidence is encoded as "true" (=1) whereas opposing evidence as "false" (=0). As such, when people engage in evaluation tasks, evidence is seen as bipolar, either confirming or disconfirming the hypothesis. However, when an individual engages in estimation tasks, evidence is seen as

unipolar, and is assessed on a continuum involving a "moving average" that reflects the position of each new piece of evidence relative to the current opinion. This subprocess distinguishes the difference between making a directional (dichotomous and explicit) interpretation and an estimated (continuous and implicit) interpretation relative to an established position

Next, in the *processing* stage, there are two types of processing strategies that hold similar meaning as the two *response modes* discussed above, namely, the Step-by-Step (SbS) and End-of-Sequence (EoS) conditions. Specifically, when using the SbS *process*, an individual adjust opinions incrementally by evaluating each piece of information processed. When using the EoS *process*, the individual adjust initial opinions formed based on the initial pieces of information by the aggregate impact of succeeding pieces of information. As a concrete illustration of the distinction between SbS and EoS processes, imagine forming an impression of "likableness" based on a series of trait adjectives described in Asch's study "Intelligent-tall-mean". In using a SbS process, the individual is assumed to anchor onto "intelligent" and then to update this impression incrementally, first by "tall", then by "mean." Thus, in order to keep track of all of the impressions, the individual is more likely to overweigh the last piece of information. In contrast, under the EoS process, only one adjustment is made as the impression is first anchored onto "intelligent" and then adjusted based on the impact of net aggregate impressions of the traits "tall" and "mean", thus, only one adjustment is made.

As illustrated above, the SbS and EoS *response mode*s corresponds with the SbS and EoS *processes* due to its similarity in meanings, however it is important to acknowledge the distinction and compatibility between them. Specifically, it is reasonable to assume that individuals faced with the SbS response mode will always use a SbS process. However, the individual may not necessarily use EoS process when faced with EoS response mode. Consider

Figure 1 that demonstrates the four cells as a result of crossing the two forms of process with the two forms of response mode. First, notice that it would be unfeasible to use EoS process when faced with SbS response mode as the response mode necessarily prompts an opinion before the individual is able to receive the next piece of information. Thus, the SbS response mode inevitably evokes the SbS process and is therefore incompatible with EoS process. Second, note that when faced with EoS response mode, the individual can engage in either EoS or SbS process as both are compatible with the EoS response mode. The distinction being that the SbS process involves participants making a *covert* evaluation each time a piece of information has been presented before moving on to the next piece of information. In this case, only the final opinion, formed after all pieces of information have been presented, is *overtly* verbalized. On the other hand, under the EoS process, all judgments are withheld when information is still being presented to the individual and only one final judgment is made after the presentation of every piece of information. The ability to shift between the two types of processes suggests that evaluators are not entirely constrained by the response mode that they face with the exception of the SbS mode. The model predicts that the amount of information load is a factor that prompts individuals to use SbS when faced with EoS response mode. As such, when faced with long and complex pieces of information, individuals will resort to SbS process to keep track of information (See figure 1). We also believe, as will be elaborated below, that there are individual differences such as thinking styles that determine whether someone uses SbS versus EoS process when faced with EoS response mode.

		Response Mode	
		SbS	EoS
Process	SbS	All tasks	Complex evidence items and/or long series
	EoS	Impossible	Simple evidence items and short series

Figure 1. Compatibility between SbS and EoS *process* and *response modes*.

Finally, the *adjustment* stage describes factors that determine the degree in which individual adjusts their current beliefs and opinions in light new pieces of information. The amount of adjustments (adjustment weight) made depend both on the impact of the new evidence and the position of the anchor which indicates presently held opinions. The adjustment weight is proportional to current position (anchor) because in the presence of a weak anchor, signifying already low opinions, a strong and negative piece of evidence will not induce much change (in absolute terms). However, if the currently held position was high, signifying strongly opposing views, then a strong and negative piece of evidence will likely cause greater change in opinion. Thus, the reduction of strength will be larger for the latter case. Most importantly, the amount of adjustment made also depends on individual and situational factors such as sensitivity towards "negative" and "positive" evidence. For example, some people may have a general tendency to give more weight to inconsistent information that is against their currently held opinions, resulting in greater adjustments. On the other hand, others may be less sensitive to inconsistent information which enables them to adapt and integrate inconsistent information quickly resulting in smaller adjustments in their currently held opinions.

Predictions of Order Effects Based on the Belief-Adjustment Model

Previous research has shown that judgments are sensitive to the manner in which they are elicited and processed (Einhorn & Hogarth, 1981; Hogarth, 1982). An advantage of employing the Belief-Adjustment Model (Hogarth & Einhorn, 1992) is that it explicitly predicts order effects based on mathematical derivations taking into consideration the three stages described above. As such, the model predicts that when using SbS process (a series of adjustments are made after each piece of evidence has been presented), and encoding using estimation (opinions are formed by averaging evidence in a unipolar manner resulting in weighted average of all the evidence), the SbS process always predicts a recency effect. When encoding using evaluation (opinions are formed by making a true vs. false evaluation in a bipolar manner) the SbS process predicts no effect of order for consistent information (all information are either pro or con messages) and a recency effect for inconsistent information (sequences involving mixture of pro and con messages).

On the other hand, when using EoS process (a single adjustment is made reflecting aggregate impact of remaining information), the model always predicts a primacy effect. This is the case for both consistent (all pro or all con messages) and inconsistent (mixture of pro and con messages) set of information. Finally, the model predicts that when individuals are exposed to longer or more complex information, both SbS and EoS will result in recency effects. This is mainly caused by the desire to reduce burdens on one's memory when given a complex set of information since aggregating a series of long or complex information would be costly in terms of cognitive resources (Tuovinen & Sweller, 1999). Keeping track of one item at a time using the SbS process makes minimal demands on memory and information-processing load. That is why

as information complexity and lengths increase, people will be more likely to engage in SbS to cope with the cognitive demand of the task (See Table 1).

Table 1.

Predictions of the Belief-Adjustment Model (Hogarth & Einhorn, 1992)

Response Mode

Task	**End-of-Sequence (EoS)**	**Step-by-Step (SbS)**
Simple	Primacy	Recency
Complex	Recency	Recency
Long Series	Forced toward primacy	Forced toward primacy

In summary, message persuasion involving relatively simple and short pieces of information, a recency effect will occur under the SbS procedure. This is reflecting attempts to keep track of changing beliefs based on succeeding pieces of information. Thus, evaluators are more likely to overweigh the last piece of information rather than the initial pieces of information. On the other hand, when decisions are made in an EoS manner, a primacy effect is more likely to occur due to the tendency to anchor onto the first piece or first few pieces of information with fewer adjustments based on one aggregate of the remaining pieces of information. The predictive validity of the Belief-Updating model is bolstered by results of predominant outcome in the existing order effect literature (for a list of studies and results and details of mathematical derivations please refer to Hogarth & Einhorn, (1992)).

In addition to the specific predictions for each of the conditions described above, individual differences also play a role in the outcome of the predictions. Recall that individuals are nevertheless free to engage an SbS process when faced with EoS response mode and that some individuals may be more sensitive to inconsistent information that results in greater or lesser adjustments in opinions. Thus, in the present study, we will explore differences in people's natural proclivity to engage in either SbS or EoS styles of information processing, tendency to adjust and adapt to new pieces of information, and engage in either evaluation or estimation when encoding information.

In the current research, we postulate that culture influences the inclination to engage in either of the two types of processing styles through cultural differences in cognitive processing styles. Moreover, previous research has shown different information processing styles between East-Asian and Western cultures, such as the use of analytical and holistic thinking. Thus, we examine the construct of analytical versus holistic thinking in relation to the Belief-Adjustment Model that impacts eventual judgment outcomes. In the current study, we focus on judgment procedures used for evaluating sequential presentation while holding the task type constant so that all participants view relatively simple and short pieces of information.

The Role of Culture and Cognitive Style

According to Hofstede (1980, p.13), culture is the "collective programming of the mind" suggesting that culture has a strong mental component that affects people's cognitive styles by selectively filtering information to which people direct their attention. A large body of research has documented cognitive differences between Westerners and East Asians in the past few years related to the analytical vs. holistic systems of thought (See Nisbett, Peng, Choi, & Morenzayan, 2001 for an extensive review). These differences can be explained by the ways in which

members of markedly different cultures are socialized from birth into divergent world views and habits of thought. As such, the considerable differences in world views and thought patterns determine beliefs that people hold about aspects of the world that ultimately influence the nature of their cognitive processes (Nisbett, et al., 2000). Previous research has demonstrated several interrelated cultural differences concerning cognitive differences between the analytical and holistic thinking styles. Based on prior evidence, we discuss three major relevant concepts: *theory of change, theory of contradiction,* and *holism*. We build on this literature to propose that a combination of factors influencing cultural differences in cognition will affect Easterners and Westerners to react differently to the effect of message order. Our discussions focus on how these major concepts in cognition relate to the three subprocesses of the aforementioned Belief-Adjustment Model. Based on this model, we offer specific predictions regarding the moderating role of culture on effects of order.

Theory of Change: Cyclic versus Linear

Theory of change asserts that the universe is in constant flux, it is dynamic, and cannot be predicted. This theory describes how East Asians view the world because they believe that elements are interconnected through complex interactions among one another, they tend to view phenomena as nonstatic and expect changes to always exist. In contrast, Westerners perceive most objects as independent, their essential characteristics stable, thus do not expect dramatic changes over time. Studies have found that when participants are asked to make future predictions about an event, East Asians tend to possess a cyclical view that assumes continuous fluctuations, whereas Westerners maintain a linear perspective that predicts patterns that are similar to previous trajectories. For example, Ji and colleagues (2001) asked Chinese and American participants to make predictions regarding their own levels of happiness throughout

the course of their lives. Results of the study showed that Chinese participants were more likely to predict nonlinear directions and movements of change (happiness can either fluctuate up or down), whereas the American participants predicted their life happiness to be moving in one direction (happiness going up or down in constant fashion). Thus, Chinese participants are more likely to assume changes and deviations from the current trend by taking on a long-term perspective, whereas Americans are more likely to assume consistent direction with current trends by taking on a short-term perspective that requires responses to information that is immediately available.

Theory of Contradiction: Naïve Dialecticism versus Formal Logic

A concept that is related to the theory of change is how people handle contradictions in light of inconsistent information. When two contradicting pieces of information exist, such as the case when encountering pro versus con arguments, East Asians tend to pursue a compromised middle ground by taking on a yin-yang approach that assumes both apparently opposite propositions can be true at the same time. This tendency to harmonize and reconcile opposites has been referred to as naïve dialecticism (Peng & Nisbett, 1999). In stark contrast, Westerners tend to pursue resolution of contradictions by taking on a formal and logical approach that assumes only one of the two opposites can be correct. Evidence supporting the two different approaches has been gathered by Peng and Nisbett (1999) who found that Chinese students preferred contradictory arguments, whereas American students preferred noncontradictory arguments.

Holism: Part vs. the Whole

Cultural psychologists now widely accept that East Asians are more holistic and assume context dependence of elements such that the part cannot be properly understood except in

relation to the whole. Moreover, holistic thinking involves understanding concepts by taking into consideration large-scale patterns and reacting to them. Whereas the holistic style of thinking embraces interconnections, it significantly differs from the cognition of Westerners who tend to engage in analytical thinking with preferences for Aristotelian logic (Kitayama, Duffy, Kawamura, & Larsen, 2003). This is because people in Western cultures are object-focused and field independent (Peng & Nisbett, 1999). As such, analytical thinking typically displayed by Westerners involves understanding concepts by thinking about their individual parts and how they work together to produce larger-scale effects. Thus, the analytical thinkers will likely view positive and negative aspects as mutually exclusive, and focus on either the positive or the negative, but not both. Lastly, evidence for the differences between the two systems of thoughts has been demonstrated in various social and cognitive domains such as attention (Ji, Peng & Nisbett, 2000), attribution (Choi & Nisbett, 1998), memory (Masuda & Nisbett, 2001), and logical reasoning (Norenzayan, Choi, & Nisbett, 2002).

Culture and the Belief Updating Model

Differences between the two systems of thoughts discussed above have characteristics that are parallel to the aforementioned Belief-Adjustment Model involving the SbS and EoS response modes. Recall that when using the EoS process, one has to be able to withhold all pieces of evidence while they are presented before making a final evaluation at the end. Thus, the model predicts that a primacy effect is more likely to occur because people will anchor onto the first piece of information and then make one final adjustment according to an overall impression based on all succeeding pieces of information. This is related to the holistic style of thinking typically found in Easterners as they are better at recognizing the interconnections between elements and harmonizing contradictions between opposing pieces of evidence. This dialectical,

"both/and" thinking, will allow holistic individuals to withhold judgments until all the information has been presented. As such, the holistic style of thinking may selectively promote a top-down, broad inference, driven by early information presented to resemble the EoS response mode that predicts the primacy effect.

In contrast, recall that SbS processing involves making evaluations after each piece of evidence has been presented. This is related to the analytical style of thinking typically found in Westerners who are less comfortable with contradictions and less likely to harmonize opposing pieces of information. Instead, they are more likely to engage in oppositional, "either/or" thinking (Bagozzi, Wong, & Yi, 1999). As such, an analytical style of thinking that involves fact-driven and systematic processing will be more likely to prompt individuals to consider information in a linear and logical fashion, as it is presented one step at a time, and update prior perspectives along the way. Because analytical thinkers are more field independent, they will likely consider information in a context-free manner, and evaluate information in a piece-by-piece fashion. Thus, this information updating approach closely parallels the SbS response mode that predicts a recency effect.

In summary, we propose that culture (East vs. West) and its concomitant effects on cognitive style (holistic vs. analytic) will moderate cognitive processes that lead to different responses in information encoding, processing, and adjusting as proposed by the Belief-Adjustment Model. Holistic thinkers are less likely to be influenced by the last piece of information due to the flexibility to take into consideration both sides of the arguments presented early as well as later in time.

H1: Chinese participants will respond more positively to pro/con messages than con/pro messages compared to Canadian participants, exhibiting a primacy effect that is explained by more holistic information processing styles.

In contrast, analytical thinkers are more likely to consider pieces of information separately and update their judgments accordingly in a linearly fashion, and thus, place more importance to the last piece of information that leads to greater susceptibility to the recency effect.

H2: Canadian participants will respond more positively to con/pro messages than pro/con messages compared to Chinese participants, exhibiting a recency effect that is explained by more analytical information processing styles.

We plan to test these hypotheses in two studies involving both Chinese and Caucasian Canadians. In the first study, all participants make decisions using the EoS response mode, so that participants are free to engage in a preferred response mode that is consistent with the cultural cognitive style. Recall that participants are free to engage in SbS or EoS process even when they are faced with EoS response mode. In the second study, we limit participants' ability to engage in either SbS or EoS process by manipulating response mode in which the messages are presented.

STUDY 1

Method

Participants

Ninety-eight undergraduate students enrolled in a large North American university participated in the study for extra course credits. Our sample population consisted of 50 Canadian students and 48 Chinese students (33 men, 65 women). We took measures to ensure that the Chinese participants were not acculturated to the Canadian culture by selecting participants born in China and had previously lived in China for at least 10 years prior to arriving in Canada. (*SD* = 5.44). The average age of the current sample was 20 years old (*SD* = 2.12). The average age for Chinese participants was 22 year old (*SD* = 3.34); there were 31 females and 17 males Chinese participants. The average age for Canadian participants were 21 years old (*SD* = 2.23), there were 34 females and 16 males Caucasian participants. Both Chinese and Canadian Participants were randomly assigned into one of two conditions based on the order of arguments presented to them so that they either saw messages in a pro/con order or in a con/pro order. Thus, our study design was a 2 (Order: pro/con vs. con/pro) x 2 (Culture: Canadian vs. Chinese) between-subjects design.

Materials and Procedures

Each participant was greeted by the experimenter and then seated at a computer station where they viewed the stimulus materials. Participants were told that the study will survey opinions regarding issues important to university students. The instructions informed all participants that their responses will affect the final decisions being made by the university as described in the stimulus material. For the content of the stimulus material, we employed similar procedures from previous research (see Petty and Cacioppo, 1986) where students were

presented with information about the new president of the university and his academic committees' intentions to implement a comprehensive exam at the end of their four-year academic career. According to the proposed plan, all students must successfully complete this exam in order to graduate from university. Participants were then presented with three strong arguments for this initiative (e.g., "students from institutions with comprehensive exams find better jobs") and three strong arguments against it (e.g., "taking one exam at the end of each course should be sufficient"), all of which were ostensibly offered by student and faculty groups on campus. The messages were equal in length (approximately 35 words each) and were pre-tested to be equally persuasive. After all arguments have been viewed, participants rated their attitudes regarding the implementation of the exam by expressing their feelings on 15 different adjectives. They were then given a chance to vote either Yes or No towards the exam. Finally, participants answered measures of thinking style and demographic questions and were debriefed regarding the true nature of the study.

Measures

Predictor Variables

Our main independent measures were message order and culture. Half of the participants were assigned to the pro/con condition and therefore they saw the 3 supporting arguments first followed by the 3 opposing arguments. The other half of the participants was assigned to the con/pro condition and saw the disadvantageous arguments prior to the advantageous arguments. This manipulation allows us to identify a primacy effect, if participants are more positive and supportive of the comprehensive exams when advantageous arguments are presented first, rather than last, and less supportive if participant are presented with disadvantageous arguments first rather than last. The reverse applies for the identification of a recency effect.

Dependent Variables

Attitude Measures. After reading the two sets of arguments, participants were asked to rate a series of semantic differential scale items that measured attitudes toward the implementation of the exam. The items assessed how participants felt about having the exam at the end of their university career. Examples include “good/bad, beneficial/harmful, positive/negative, reasonable/absurd”. In total, there were 16 items. Each item was measured using a 7-point likert scale from 1 = “Bad” to 7 = “Good”. The 15-item semantic scale was submitted to an exploratory factor analysis in order to compute a composite attitude scale. The initial Eigen values showed that two separate factors emerged with values above 1, with most items loading on the first factor explained approximately 50% of the total variance. After examining the rotated factor output, five items were eliminated because they did not contribute to a simple factor structure and failed to meet a minimum criteria of having a primary factor loading of .4 or above (see Table 2). When we combined the 11 remaining items —" Bad vs. Good," "Negative vs. Positive," " Unsupportive vs. Supportive," " Unreasonable vs. Reasonable" Harmful vs. Beneficial ," Advantageous vs. Disadvantageous ," Wise vs. Foolish ,"" Pessimistic vs. Optimistic ," Worthless vs. Valuable " and "Unprofitable vs. Profitable ", —into the primary overall attitude scale score, the internal consistency reliability (α) of the score was found to be α = .88. This is a very good level of reliability.

Table 2
Rotated loadings from principal components analysis with Varimax rotation on 17 Semantic differential scale items (N = 98)

	1	2
	Component	Component
Bad vs. Good	**.81**	.22
Negative vs. Positive	**.91**	-.07
Unprofitable vs. Profitable	**.61**	-.22
Unsupportive vs. Supportive	**.78**	-.14
Unreasonable vs. Reasonable	**.83**	.15
Absurd vs. Sensible	.28	.25
Simple vs. Complex	.30	.75
Harmful vs. Beneficial	**.87**	.07
Helpful vs. Unhelpful	**.86**	-.16
Advantageous vs. Disadvantageous	**.87**	-.14
Wise vs. Foolish	**.80**	.03
Consistent vs. inconsistent	.44	.01
Innovative vs. old-fashioned	.42	-.61
Unfavourable vs. favourable	.30	.10
Pessimistic vs. Optimistic	**.78**	.21
Worthless vs. Valuable	**.72**	-.14

Note: bolded items indicate items retained for study 1 and study 2.

Behavioural Intention Measure. Participants were also asked to vote on whether they would like to implement the comprehensive exam. They were given the option of voting "Yes or No". This measure offers additional information regarding the persuasiveness of the arguments by asking participants to make an intentional and decisive "yes or no" decision. We include both measures of attitudes toward the exam and behavioural intention because both types of measures can reveal whether order effects have occurred. Further, the two measures are distinguishable based on the Theory of Reasoned Action developed by Fishbein and Ajzen (1975). Attitude

refers to the sum of beliefs about an object or event, whereas behavioural intention refers to a function of both attitudes toward an object or event and has been found to predict actual behaviour (Miller, 2005).

Cognitive Thinking Style. We used the Analysis-Holism Scale (AHS) (Choi, Koo, Choi, 2007) to measure analytic versus holistic thinking style. Upon the completion of ratings for the two study scenarios, participants were asked to complete the analytical and holistic thinking scale, which included 24 items comprised of 4 subscales. Items on this subscale addressed Causality measured by 6 items (α = .73), an example item being "*Everything in the world is intertwined in a causal relationship*". Attitude toward Contradictions was measured by 6 items (α = .68), an example item being "*It is more desirable to take the middle ground than go to the extremes*". Perception of Change was measured by 6 items (α = .72), an example item being ". *Future events are predictable based on present situations*". Finally, Locus of Attention was also measured by 6 items (α = .73), an example item being "*It is more important to pay attention to the whole context rather than the details*".

Control variables. We controlled for mood and message relevance as previous research has demonstrated potential effects of these two variables on order effects. Following previous research that have examined the role of mood on effects of order, participants responded to two scales measuring current mood on a 7-point likert scale. "1" = sad/feeling bad, "7" = happy/feeling good. These two scales were strongly correlated (r=.80), and were combined into a single affect valence measure (Forgas, 2010). To measure individual differences in how important the issue of having a comprehensive exam was to participants, they were asked "how relevant is the issue of having a comprehensive exam at the end of your academic career"?

Participants were asked to indicate on a 7 point likert scale, 1 = “not very relevant” to 7 = “very relevant”.

Results

We first began by correlating the attitude measures and behavioural intention measures together (see Table 3). Results showed that participants’ attitudes toward the exam were significantly and negatively correlated with the intention to vote yes or no ($p < .00$), suggesting the more favourably participants’ attitudes were toward the exam; the more likely they were to vote yes. As anticipated, Chinese participants were significantly more holistic than Canadian participants in terms of Causality and Attitudes toward Change ($p = .03$). Consistent with our discussions above, Chinese participants were more likely to acknowledge the interconnections between elements of the world and be more ready to comprise a middle ground between two extremes. Unexpectedly, there was no significant difference between Chinese and Canadians on Perception of Change ($p = .75$) and Locus of Attention ($p = .74$). However, the results were in the correct direction where Chinese participants expect more changes and pay attention to the field as a whole compared to Canadian participants. There were no significant differences between culture on measures of attitudes toward the comprehensive exam or the behavioral intention to vote either Yes or No for the implementation of the comprehensive exam.

Table 3.
Pearson Correlation Matrix among Relevant Variables in Study 1.

1. Culture	-0.22*	-0.26*	-0.05	-0.03	-0.07	-0.15
2.Causality		0.35**	0.01	0.28**	0.06	0.06
3. Attitude towards Contradiction			-0.01	0.26*	0.12	0.10
4. Perception o Change				0.05	-0.13	-0.18
5. Locus of attention		.			0.05	0.06
6. Behavioural measure						-.65**
7. Attitude measure						

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Hypotheses Testing

We hypothesized that Chinese participants, who tend to be holistic thinkers, will respond more positively to pro/con messages rather than con/pro messages exhibiting a primacy effect. We also hypothesized that Canadian participants, who tend to be analytical thinkers, will display the recency effect by responding more positively to con/pro rather than pro/con messages in both attitudinal and behavioral measures. To test these hypotheses, we first conducted a Order: pro/con vs. con/pro) x 2 (Culture: Canadian vs. Chinese) Analysis of Covariance (ANCOVA) on attitudes towards the comprehensive exam controlling for mood and relevance by including them as covariates. There were no main effects of either culture or order, however, there was a marginally significant interaction between culture and order, (F (1, 97) = 3.83, p = .05).

To better understand this interaction, we examined the effect of order within both cultures by splitting the file by participant culture. Results showed that as predicted in Hypothesis 1, Caucasian Canadian participants in the con/pro condition (M = 4.72, SD = .23) had more favourable attitudes towards the comprehensive exams than those in pro/con condition (M = 4.34, SD = .21), thus demonstrating a recency effect (F (1, 50) = 5.35, p = .02). For the Chinese participants, there was no effect of order (F (1, 46) = .44, p > .05), although the pattern of finding was in the predicted direction whereby participants in the con/pro condition (M = 4.12, SD = .23) gave less favourable ratings than those in the pro/con condition (M = 4.42, SD = .22). In sum, with respect to attitudes, Hypothesis 1 was supported with a recency effect for Canadian participants but Hypothesis 2 was not supported with a primacy effect for Chinese participants (See Figure 2 and Figure 3).

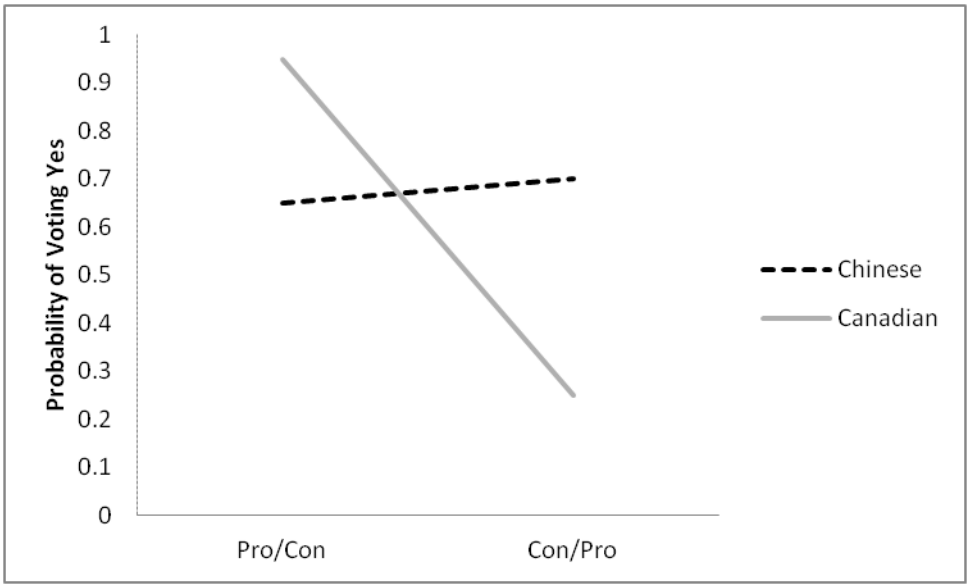

Figure 2. Significant interaction between message order and culture on likelihood of voting for or against the exam.

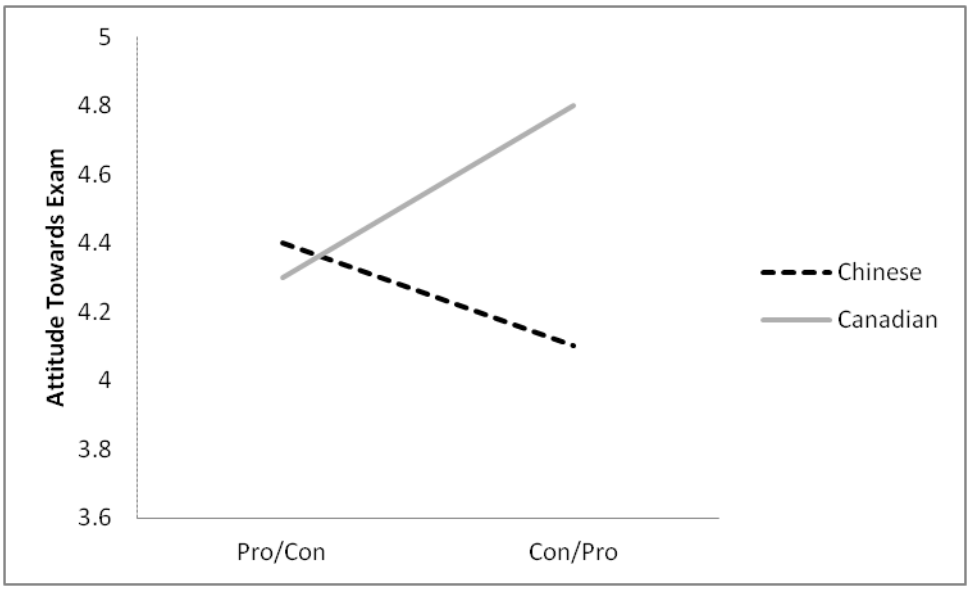

Figure 3. The interaction between message order and culture on attitude toward the exam showing a significant recency effect for Canadians.

To test effects order and culture on our behavioural intention measure, we used a two-predictor logistic model because the dependent variable (vote outcome) and independent variables (Order, culture) are dichotomous. Logistic regression analysis was carried out by the binary logistic procedure in SPSS. We controlled for mood and relevance as a covariate by entering it in the first step, followed by culture and message order. Finally, we entered an interaction term between culture and message order in the last step. Adding in the interaction variables, the second analysis provided a more accurate fit for the data (Analysis 2: -2 Log Likelihood=113.76 compared to Analysis 1: –2 Log Likelihood=120.01).

Predicted Logit of (Voting) = 1.61 + (- 1.10)*Culture + (- 1.74) * Condition + 2.30*(Culture by Condition)

According to the final model, the log odds of voting for the comprehensive exam depends on the message order as well as the culture of the participant (*Wald* = 5.94, *Exp(B)* = 9.93, $p < .05$) (see Table 4). Upon closer examination, in support of Hypothesis 2, Chinese participants displayed a strong primacy effect, indicating greater likelihood of voting yes in favour of the exam when the advantageous information was presented first, rather than last, and greater likelihood of voting no against the exam when the disadvantageous information was present first, rather than last (see Figure 2). However, Canadian participants did not show either effects of primacy or recency in their behavioural intentions.

Table 4

Summary of Logistic Regression Analysis for Variables Predicting Decisions to Vote for Comprehensive Exam, with Controls

Predictor	*B*	*SE*	*Wald*	e^B
Mood	0.35	0.22	2.61	1.42
Relevance	0.49	0.12	4.32	2.40
Culture	-1.10	0.22	2.61	1.42
Condition	-1.74*	0.14	0.05	0.97
Culture * Condition	2.30*	0.94	5.94	9.93
Constant	1.61**	0.54	8.89	4.99

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Note: e^B = exponentiated *B*. Vote coded as 0 for *yes* and 1 for *no*.

Hypotheses 1 and 2 also predicted that cognitive thinking style would explain, or mediate, the effects of Culture and Order on attitude and behavioural measures. We followed steps outlined by Baron & Kenny (1986) such that the relationship among *X*, *Y*, and the *M* are tested by 1) *Y* is regressed on *X* (in our case X is the interaction term: of Order X Culture), 2) *M* is regressed on *X*, and 3) *Y* is regressed on both *X* and *M*. We met the requirements of step 1 in the analyses above by finding that the interaction between culture and message order significantly predicted voting intention. In order to meet the requirements for Step 2, we tested whether thinking style predicted the interaction between order and culture. We entered thinking style, message order, and the interaction terms between the two. Results showed a marginally significant two-way interaction on voting outcomes (Wald = 2.80, Exp(B) = .20, $p = .08$). Thus, we test step 3 by regressing the interaction between culture and message order while controlling for the effect of thinking style. Results showed that after controlling for the effect of cognitive thinking, the interaction between culture and message order remained significant (*Wald* = 5.09, *Exp(B)* = 7.68, $p < .05$). Thus, the results did not meet the requirements for step 3 for a full or partial mediation analysis (because the significance value remained the same) suggesting a direct relationship between culture and order effects that is not due to role of cognitive styles alone. We examine whether cognitive thinking style mediates the relationship between order effects and culture on attitudinal measures. Results failed to meet step 2 of the mediation requirements as cognitive thinking style did not significantly predict the interaction between order and culture ($F(1, 97) = .41$, $p > .53$).

Exploratory Analyses

Because we did not obtain evidence for thinking style as a mediator, we explored the possibility of a three-way interaction between thinking style, culture, and order effects. Specifically, we examined the sub-factor of attitudes toward change because it differed significantly among culture. We conducted a logistic regression with dichotomous dependent variable (vote outcome) and two dichotomous independent variables (order and culture) as well as a continuous variable of cognitive thinking scale. We controlled for mood and relevance as covariates by entering it in the first step, followed by culture and message order. Next, we entered 3 separate two-way interaction terms between culture and response mode, culture and message order, and message order and response mode. Finally, a three-way interaction between all three predictor variables was entered in the last step. We did not find a significant three-way interaction between message order, culture, and thinking style (*Wald* = -0.74, *Exp(B)* = 4.78, $p >$ .05).

Next, we examined the role cognitive thinking style by directly testing the interaction between thinking style and message order on behavioural intention measures. We conducted a logistic model with a dichotomous dependent variable (vote outcome) and dichotomous independent variable (order), as well as a continuous variable of cognitive thinking scale. We controlled for mood and relevance as a covariate by entering it in the first step, followed by thinking style and message order, and an interaction term between thinking style and message order. There was a significant main effect of message order (*Wald* = 5.14, *Exp(B)* = 4.72, $p <$ .05), and also a main effect of thinking style (*Wald* = 5.14, *Exp(B)* = 4.72, $p < .05$). Results showed a marginally significant two-way interaction on voting outcomes (*Wald* = 2.80, *Exp(B)* = .20, $p = .08$). Figure 4 shows that analytical individuals who viewed the pro/con order were less likely to vote yes for the exam and those that viewed the con/pro order were more likely to vote

yes for the exam. The reverse of was true for holistic individuals, thus demonstrating a recency effect for analytical individuals and primacy effect for holistic individuals.

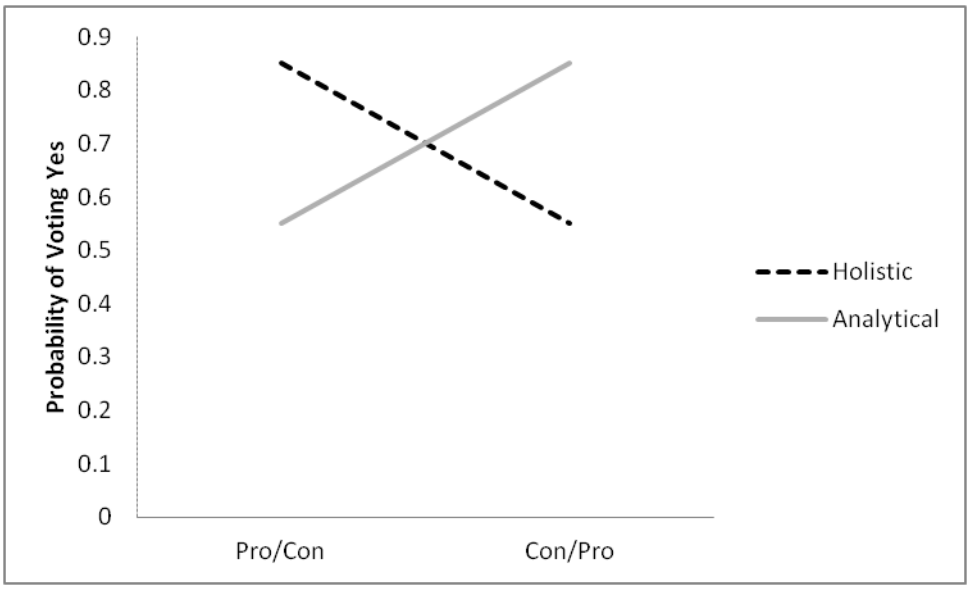

Figure 4. The interaction between message order and thinking style on likelihood of voting yes for the exam showing a primacy for holistic thinkers and a recency effect for analytical thinkers.

In summary, we found support for a recency effect among Canadian participants with respect to attitudes and a primacy effect among Chinese participants with respect to behavioural outcomes. Consistent with our hypotheses, we also found that with respect to behavioural intentions, analytical individuals were more prone to the recency effect whereas holistic individuals were more prone to the primacy effect. However, we did not find support for the predicted mediation model, in which the joint effects of Order and Culture could be explained by cognitive thinking style. In other words, although our Canadian and Chinese participants did differ significantly on our holistic thinking measure, their holistic thinking style did not explain the interaction of Culture and Order. This finding does not discount the importance of thinking

style because analytical individuals displayed more recency effect while holistic individuals thus displayed the primacy effect.

We did not find the effect of recency for Canadians in terms of behavioural tendencies, however; the significant interaction between message order and culture emerged for attitudinal measures for Canadians. For the Chinese participants, we did not find significant order effects with respect to attitude measures. However, results of the behavioural intention measures provide support for our hypothesis. This cultural difference is noteworthy given that the two behavioural and attitudinal measures were significantly correlated across both cultures. Thus, the inconsistent findings are somewhat surprising. It is interesting to note that a number of theorists have proposed that the behavioural intention measures, rather than attitude, are closest cognitive antecedent of actual behaviour (e.g., Triantis, 1977). Previous research has consistently found that attitudes were very poor predictors of actual behaviour raising concerns in many social psychologists regarding the utility of the attitude construct. (e.g., Blumer, 1955; Campbell, 1963; Deutscher, 1966; Festinger, 1964). This could potentially explain why behavioural intention measures in our study provided more strong evidence of order effects than attitude measures.

Overall, we found evidence for the impact of culture and order on attitude and behavioural responses in this study; however, a major limitation with the current study is that we cannot determine whether the different response processes are causing the order effects. This is because we allowed participants from both cultures to engage freely in either SbS or EoS process, as they are both compatible with EoS response mode. In Study 1, we tried to capture different response modes by measuring and testing analytical vs. holistic thinking style as a mediator. In study 2, we use more direct test of response mode by manipulating the response mode so that participants from both cultures will engage in both SbS and EoS response mode.

This will allow us make more definite conclusions regarding the role of response mode and thinking style. In addition, as suggested by previous research, manipulating the response mode provides another way to test the mediation mechanism of thinking style.

STUDY 2

In study 1, we found that Chinese participants were more influenced by information presented early on, thus exhibiting a primacy effect but only on behavioural measures. Canadians were influenced by the recency effect but only on the attitudinal measures. In order to test whether the effect of order was due to differences in cognitive processes that differ among cultures, Study 2 engages participants from both cultures in the two different types of response mode. Recall the compatibility of the two types of response modes with two different types of processes. Recall that an End of Sequence (EoS) response mode is compatible with both EoS and Step-by-Step (SbS) processes, because when participants are required to make a final judgment at the end of a task, they may choose to make step-by-step evaluations along the way or to hold off making a judgment until all arguments are presented. A SbS response mode, however, is incompatible with EoS process as it forces participants to make an evaluation of each piece of information prior to moving on to further evidence. Thus, by assigning participants to an EoS or SbS response mode, we should be able to disentangle when participants engage in EoS vs. SbS processes.

When participants are instructed to use an EoS response mode, we expect that consistent with Study 1, Chinese participants will exhibit the primacy effect due to holistic thinking style and EoS processing. However, we expect Chinese participants instructed to use an SbS response mode will be less likely to show the primacy effect as they are forced to make decisions in a step-by-step manner that should elicit a recency effect. In this case as illustrated in Figure 1, it would be impossible even for Chinese participants to engage in EoS information process. When judgements are required after every piece of information, it is much harder to withhold judgements until all pieces of information have been presented. The ability to withhold

judgements until the very end and to evaluate information by integrating all pieces of information contributes toward the occurrence of a primacy effect. Because the SbS response mode inevitably eliminates the possibility of both options, we expect the elimination of primacy effect for Chinese participants who view information in the SbS condition.

H3. Chinese participants will be more likely to display the primacy effect in the EoS condition than in the SbS condition.

In contrast to our expectations for Chinese participants, when instructed to use an EoS response mode we expect that Canadian participants, who are less likely to engage in holistic thinking and more likely to engage in SbS processing, will be likely to display a recency effect. Likewise, we expect that Canadians will also demonstrate the recency effect under SbS response mode condition as it forces participants to isolate each piece of information in a piecemeal fashion. We believe that this will facilitate information processing style in a linear fashion that is consistent with analytical thinking styles found in Westerners. In the EoS response mode, because both EoS and SbS processes are possible, we expect Canadians to engage in SbS process that will facilitate a recency effect.

H4. Canadian participants will be more likely to display the recency effect in the SbS condition than in the EoS condition.

Method

Participants

Seventy-three undergraduate students enrolled at the same University participated in the study for extra course credits. Participants who participated in the first study were not eligible for the current study. Our sample population consisted of 35 Canadian students and 38 Chinese

students (22 men, 51 women,). Again, we took measures to ensure that the Chinese participants were not acculturated to the Canadian culture by selecting participants born in China and had previous lived there for at least 10 years prior to arriving in Canada. The average age of the current sample was 21 years old (*SD* = 2.43). There were 30 females and 8 male Chinese participants. The average age for Canadian participants were 20 years old (*SD* = 2.21), there were 21 females and 14 male Caucasian participants. Both Chinese and Canadian participants were randomly assigned into one of eight possible conditions consisted of 2 (Order: pro/con, con/pro) x 2 (Culture: Canadian vs. Chinese) x 2 (response mode: SbS, EoS) between-subjects design.

Materials and Procedures

The same procedure from Study 1 was followed. At the onset of the experiment, all participants were under the assumption that their opinions expressed in the current study will play a significant role in the outcome of the decision being made by the university as described in stimulus material. Students were then presented with same set of information concerning the implementation of a comprehensive exam at the end of their four-year academic career. All arguments were identical as the previous study.

Response Mode

We incorporated the manipulation of response mode by designing two different conditions. In the SbS condition, participants made a new rating of the exam initiative after reading each argument. Specifically, participants in the SbS condition made judgments after each argument on 4 different scales measuring their attitudes towards the exam (bad vs. good, harmful vs. beneficial, foolish vs. wise, and negative vs. positive). This SbS rating procedure was modeled after previous research (Bond et al., 2007; Russo et al., 1998). After judging all the

arguments, participants expressed their final judgment of the exam initiative on the 11-item measure as well as a choice to vote "yes or no" towards the implementation of the exam.

Participants in the EoS condition did not make evaluations after each argument. Instead, they viewed each argument and clicked a button to advance to the next argument (participants could take as long as they needed). After viewing all the arguments (both pro and con), participants expressed final judgment of the exam initiative in the same fashion as the SbS condition (i.e., on an 11-point scale regarding attitudes toward the exam initiative and an intentional and decisive choice of "yes or no" and). Finally, participants answered mreasures of thinking style and demographic questions and were debriefed regarding the true nature of the study.

Measures

Predictor Variables

The independent measures were message order, participant culture, and response mode. Half of the participants were assigned to the pro/con condition and therefore they saw the advantageous arguments first followed by the disadvantageous arguments. The other half of the participants was assigned to the con/pro condition and saw the disadvantageous arguments prior to the advantageous arguments. We randomized the conditions so that an even number of Chinese and Canadian participants were distributed across the 8 possible conditions.

Dependent Variables

Cognitive Thinking Style. We used the same scale as study one, Analysis-Holism Scale (AHS) (Choi, Koo, Choi, 2007), to measure analytic versus holistic thinking style. Upon the completion of ratings for the two study scenarios, participants were asked to complete the analytical and holistic thinking scale, which included 24 items comprised of 4 subscales.

Attitude Measures. We adapted the attitude measure used in Study 1; however, instead of using all items that were used in study one, we only included scale items that were retained from the previous measure according to the appropriate factor loadings. As such, for the attitude measures, participants rate a series of 11 semantic differential scale items retained from the first study that measure attitudes toward the implementation of the exam. Similar to study 1, each item was measured using a 7-point likert scale from 1 = "Bad" to 7 = "Good". The 11-item semantic scale was submitted to an exploratory factor analysis in order to compute composite attitude scale. Factor analysis returned a one-factor solution with all items loading on the first factor explaining approximately 63% of the total variance. A composite measure of attitude towards the exam was constructed by averaging the responses of the 11 items ($\alpha = .93$).

Behavioural Intention Measure. Participants were asked to vote on whether they would like to implement the comprehensive exam. They were given the option of voting "Yes" or "No".

Control Variables. We controlled for mood and message relevance with the same scales items used in the previous study.

Results

A correlation table of all independent and dependent measures appears in Table 5. As in Study 1, participants' attitudes toward the exam were significantly and negatively correlated with the intention to vote Yes or No ($p < .00$) suggesting that the more favourably participants' attitudes were toward the exam, the more likely they voted yes. As anticipated, Chinese participants were significantly more holistic than Canadian participants in terms of Locus of Attention ($p = .04$), a finding that is consistent with our discussions above that Chinese participants are significantly more likely to pay attention to the field as a whole compared

Canadian participants. Unexpectedly, there were no significant cultural differences between Chinese and Canadians on Causality (p = .30), Attitude toward Contradiction (p = .28), and Perception of Change (p =.69). However, the results were in the correct direction indicating that Chinese participants are more comfortable with contradictions, more likely to expect changes in the environment and see the interconnection between events and objects. The non-significant findings are likely due to a smaller sample size (See table 5).

Table 5.
Pearson Correlation Matrix among Relevant Variables for Study 2.

	1	2	3	4	5	6	7
1. Culture		0.12	0.13	0.05	0.24*	0.02	0.16
2.Causality			0.04	0.12	-0.05	0.01	0.05
3. Attitude towards Contradiction				-0.09	0.12	-0.09	-0.01
4. Perception of Change					-0.06	-0.05	0.07
5. Locus of attention			.			-0.07	0.09
6. Behavioural measure							-0.59**
7. Attitude measure							

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

There were no significant differences between culture on measures of attitudes toward the comprehensive exam (p > .05) or the behavioral intention to vote either Yes or No for the implementation of the comprehensive exam (p > .05).

Hypotheses Testing

We hypothesized that in the EoS condition, Chinese participants will be more likely to display the primacy effect than Chinese participants in the SbS condition because the SbS *response mode* manipulation inevitably evokes an SbS *process*, which induces a recency effect. Thus, we expect a primacy effect for Chinese participants in the SbS condition (H3). Further, we predicted that Canadian participants would be more likely to display a recency effect in the SbS condition than the EoS condition (H4). To test our hypotheses, we conducted a 2 (Order: pro/con vs. con/pro) x 2 (Culture: Chinese vs. Canadian) x 2(Response Mode: EoS vs. SbS) Analysis of Covariance (ANCOVA) on attitudes measures toward the comprehensive exam controlling for mood and relevance by including them as covariates.

Results revealed a significant three-way interaction between culture, response mode, and order (F (1, 73) = 5.22, p = .03). To understand the pattern of the interaction, we examined the effects of message order and response mode manipulation within both cultures. Results showed that there was no main effect of order, response mode, or an interactive effect of the two for Canadian participants on attitude measures (F (1, 35) = .21, p > .05). This is inconsistent with findings obtained in study 1 where we found a marginally significant interaction showing recency effect for Canadians.

For the Chinese participants, there were no main effects of message order (F (1, 33) = .42, p > .05) or response mode, (F (1, 33) = .20, p > .05). However, there was a significant interaction between message order and response mode on attitude measures (F (1, 36) = 8.08, p = .008). Unexpectedly, results showed pattern such that Chinese participants using the EoS response mode showed a rencency effect, rating the exam significantly less favourably in the pro/con (M = 3.00, SD = .21) condition than in the con/pro (M = 4.39, SD = .23) condition, (F (1,

15) = 5.53, p = .03). There were no significant differences in the SbS condition (F (1, 21) = 2.43, p > .05).

Next, to test effects of order and culture on our behavioural intention measure, we used a three-predictor logistic model because the dependent variable (vote outcome) and independent variables (message order, culture, and response mode) are dichotomous. We controlled for mood and relevance as covariates by entering it in the first step, followed by culture and message order. Next, we entered 3 separate two-way interaction terms between culture and response mode, culture and message order, and message order and response mode. Finally, a three-way interaction between all three predictor variables was entered in the last step. Results showed a significant three-way interaction on voting outcomes (*Wald* = 6.99, *Exp*(B) = 8.93, p < .05). In order to further interpret this interaction, we split the data file by culture to examine the interaction between response mode and message order among Chinese and Canadian cultures separately.

As with the behavioural measures in Study 1, there was a non-significant interaction between order of message and response mode for Canadian participants (*Wald* = .39, *Exp(B)* = .30, p > .05). However, there was a significant interaction between response mode and order of message for the Chinese participants (*Wald* = 4.35, *Exp(B)* = 79.84, p =.03). This interaction revealed that in the EoS condition, Chinese participants in the pro/con condition were significantly more likely to vote yes than those in the con/pro condition. This finding replicated the primacy effect for Chinese participants that was also found in study one supporting hypothesis H3 (*Wald* = 4.04, *Exp*(B) = .043, p = .04). In both studies, Chinese participants were consistently more likely to vote in favour of the exam if they saw the pro arguments first followed by con arguments.

Further, there was no effect of order in the SbS condition for Chinese participants (*Wald* =.14, *Exp(B)* = .083, *p* >.05). We nevertheless examined the pattern of results and found that those who viewed the supporting arguments first, followed by opposing arguments, were less likely to vote yes than participants who were in the con/pro condition, thus demonstrating a recency effect. This pattern was in the expected direction; however, it did not support our hypothesis of finding a recency effect in the SbS condition (See Figure 5).

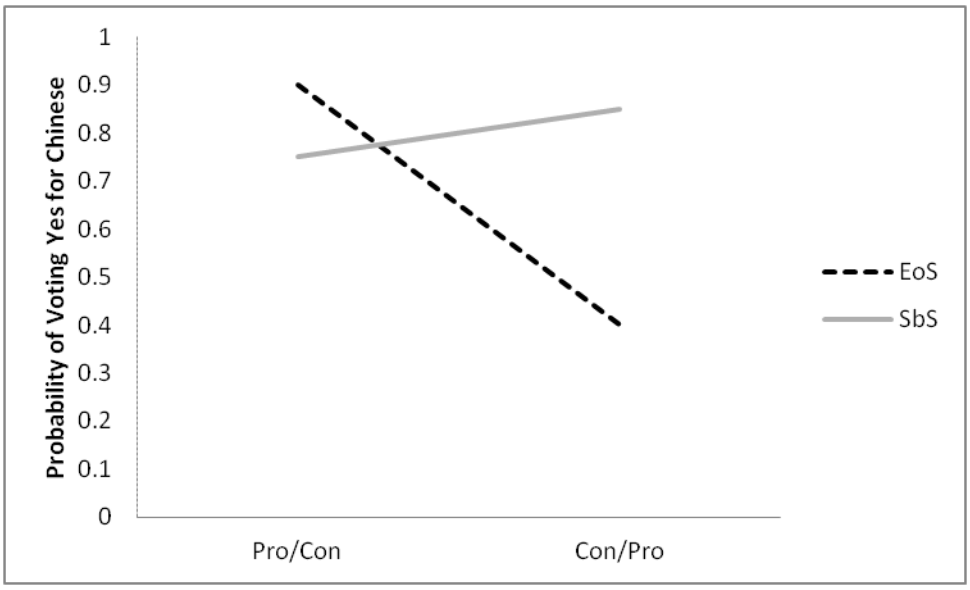

Figure 5. Significant interaction between message order and response mode for Chinese participants showing a primacy effect in EoS response mode and recency effect in SbS response mode.

Exploratory Analyses

Finally, we examine the role of cognitive thinking as a potential mediator for the the significant interaction between response mode and message order for Chinese participants. We investigate whether we will find the interaction between response mode and message order that

indicated a primacy effect for Chinese participants in the EoS response mode after controlling for the effect of analytical and holistic thinking. We tested this by conducting the two-way logistic regression between response mode and message order while controlling for the effect of cognitive thinking style. We found that the interaction is no longer significant, instead there is a marginally significant interaction between response mode and message order (*Wald* = 3.29, *Exp(B)* = 30.31, *p* =.07). This result suggests that cognitive thinking style partially mediated the primacy effect displayed by Chinese participants under the EoS response mode. Results supported our hypothesis that analytical Chinese participants are less likely to demonstrate the primacy effect. This set of analysis provides further support for thinking style as a mediator of order effects.

In summary, Consistent with Study 1, there was no effect of order for Canadians on behavioural tendencies, but results were inconsistent in that we did not find the recency effect that was present in study 1 on attitude measures for Canadians. In this study, we did not find any significant order effects for Canadians on both measures of attitude and behavioural tendency. We replicated study 1 by finding that Chinese participants in the EoS condition continued to exhibit the expected primacy effect as we expected. By manipulating response mode such that Chinese participants were forced to use a step-by-step, analytical processing mode, we were able to eliminate the primacy effect that was found in Chinese participants in the previous study. Additional support was provided through exploratory analyses on the role thinking style and order effects. These results support the mediating role of information processing style in explaining the primacy effect for Chinese participants. Overall, we provided support for thinking style as a mechanism that explains the effect of order and culture for Chinese participants.

However, our results do not provide evidence regarding culture and order effects for Canadian participants because their opinions were not influenced by the response mode.

GENERAL DISCUSSION

Previous research examining the effects of message order has mainly focused on the content and length of the messages being presented. The present research investigated factors relevant to the message receiver that can affect the likelihood of either primacy or recency effects. In two experiments, we measured differences due to one's cultural background and cognitive thinking style to examine the effects of message order and response mode. Based on predictions according to the Belief-Adjustment Model (Hogarth & Einhorn, 1992), we predicted that cognitive information processing styles that differ across cultures have parallel effects that are induced by either Step-by-Step or End-of-Sequence response modes. Overall, we found evidence supporting our hypotheses as Chinese participants 1) displayed a primacy effect for behavioural judgements when response mode was not manipulated, 2) displayed a primacy effect under the End-of-Sequence response mode, and 3) showed no primacy effect when they were forced to make judgements using the Step-by-Step mode. On the other hand, Canadians displayed a marginal recency effect on attitudinal measures in Study 1, but in no effects of either primacy or recency in Study 2. Below these findings are unpacked by addressing 1) the role of cognitive thinking style and primacy effects for Chinese, 2) the lack of strong support for a recency effect for Canadians, and 3) the inconsistent results between attitude and behavioural measures.

Results of the current study provided the first direct evidence documenting the mediating role of cognitive thinking style on message order effects in opinion change. By directly manipulating the order of the messages and the response mode, findings suggest that the order in which pro versus con arguments are presented as well as *how* the arguments are processed and evaluated play a crucial role in influencing Chinese participants' final judgments. As a result of

the current findings, it is not only important to devote attention and care towards the content of the message in terms of maximizing its persuasiveness, it is also important to examine factors within the receiver and the manner in which evaluations are made that might impact the effects of primacy and recency.

Specifically, we replicated previous research by drawing on the corresponding relationship between the effects of response mode and cognitive thinking styles that vary between cultures. We found support showing that Chinese participants displayed the primacy effect consistently across study 1 and 2 in terms of behavioural intention measures. We proposed that this due to the fact that Chinese participants are holistic thinkers, who are more likely to naturally engage in EoS information processing. In support of this line of reasoning, we found that this effect of primacy was eliminated when Chinese participants read and responded to the arguments in a SbS fashion.

We also obtained partial support for the effect of recency in the SbS response mode as Canadian participants showed the recency effect on attitudes toward the exam. However, we did not obtain support for the effect of recency in SbS conditions consistently across both studies, as there were no effects of order suggesting Canadians are equally displaying primacy and recency effects. This result was not consistent with previous findings in the literatures because a SbS response mode predicts a recency effect of order. We also did not find a primacy effect for Canadians in the EoS response mode suggesting that they were not as sensitive to response mode as Chinese participants.

A potential explanation for the null finding of order effects among Canadians is the different styles of process used in encoding and adjustment subprocceses of the Belief Adjustment Model. When encoding messages, Chinese are more likely to take on the *estimation*

mode by averaging a series of evidence due to their comfort and tolerance with contradictions. On the other hand, Canadian thinkers are more likely to take on the *evaluation* mode by evaluating each piece of evidence that either support the current belief/position (true) or do not support the current belief/position (false). Further, in the adjustment phase, recall that adjustments are made based on the differences between current position and the direction of succeeding pieces of information. Because of their tolerance for contradiction, there will be fewer adjustments toward the opposing information for holistic individuals thus decreasing the likelihood of recency effect. However, because they have less tolerance for contradiction, the last piece of information will be much more impactful in terms of belief adjustments for Canadian individuals thus increasing the likelihood of recency effects. Thus, more Chinese participants will anchor for security on the first few pieces of information because of their tolerance for change, however, there would be equal among of Canadians that anchor as well as make dramatic adjustments toward the con argument in their final opinion because Canadians are less likely to compromise in the event of contradictions. When presented with pro versus con messages, Canadians are likely to resolve contractions by choosing one of the two opposite propositions. If both positive and negative propositions were equally strong in persuasiveness, then we would expect a random distribution of choices for pro versus con, that in term balances out the overall primacy and recency effects for Canadians.

By exploring the role of analytical and holistic thinking specifically, we were able to show that analytical individuals are more prone to the recency effect whereas holistic individuals were more susceptible to the primacy effect. We also obtained evidence that analytical vs. holistic thinking partly explain the relationship between message order and response mode on order effects. Thus, another reason why we did not find significant differences for Canadians is

that individual differences between analytical and holistic thinking may have surpassed cultural differences. That is, there might have been equal among of holistic and analytical thinkers among Canadian sample population, but more holistic thinkers among Chinese participants thus exhibit greater influence of individual differences that contribute to the primacy effect in Chinese but not in Canadian participants (Na, Grossmann, Varnum, Kitayama, Gonzalez, & Nisbett, 2010). The non-significant difference of thinking style, as measured by several of the subscales, between Chinese and Canadians is an indication of this (see Table 4 and 5).

In both study one and two, attitude measures were highly correlated with the intention to vote yes or no, however, results for the behavioural intention measures provided better support for our theory. This is possibly because participants considered the voting option to be more impactful on the outcome of potential policy changes therefore the effect of order was more evident here than the attitude survey. As discussed, existing research show that attitudes are very poor predictors of actual behaviour and behavioural intention measures tend to be more accurate predictors of actual behaviour (e.g., Blumer, 1955; Campbell, 1963; Deutscher, 1966; Festinger, 1964). In our case, the behavioural measures exhibited significant order effects rather than attitude measures in most cases indicating that order effects are more likely to manifest in behavioural intentions and actual behaviours. This is noteworthy because previous research has mainly focused on attitudinal measures only when examining order effects.

One potential concern associated with the present study would be that perhaps there are cultural differences associated with the receptivity of having a comprehensive exam. Across both studies, we found no statistical significance for the likelihood of voting yes or no toward the implementation of the exam. (Study one: t (96) = .57, $p > .05$, study two: t (71) = .20, $p > .05$). Thus, our data does not suggest the possibility of cultural biases in terms of final decisions

because both Chinese and Caucasian Canadians were equally likely to vote yes or no toward the exam.

Theoretical and Practical Implications

The current work holds some interesting implications for existing theory and practice in the area of persuasion and opinion change. We provide evidence supporting the Belief-Adjustment Model by taking on a cultural perspective that shed light on the cognitive processes that influence the effect of message order. Specifically, we found that Chinese as well as holistic thinkers are more influence by the primacy effect when they view messages in an EoS manner. The Model predicted a primacy effect because when making judgements at the end of all messages instead of in a SbS manner, the evaluator is more likely to anchor on to the first few pieces of information and aggregate the later pieces of information. We offer another account of this finding by incorporating differences in cognitive thinking as predicted by the framework on cognitive thinking style. We found that holistic thinkers are more likely to engage in top-down broad inference that emphasis the first pieces of information. Thus, the primacy effects do not emerge when forced to make judgements in EoS process. We did not obtain evidence for the potential mediating role of thinking style on recency effects for either culture suggesting factors other than information processing style as elicited by the response mode may be responsible for the recency effect. For example, research has found that the amount of elaboration given to a certain piece of information contributes to the recency effect. Messages that receive less attention will be more likely to promote the recency effect.

Results from the current research suggest that when framing messages to appear persuasive to message receivers, it is important to consider the cultural background and the way in which the arguments are presented for certain cultures. While we do not have control over the

preferred style of information processing in an individual, there are ways to maximize the influence of an argument. The present explored two ways of eliciting opinions, one way is by making sure people take time to reflect evidence from every piece of information one step at a time or after all evidence has been presented. Our findings suggest that in order to maximize persuasiveness of a message to an East Asian individual, it is important to present strong arguments first and present all sides of the arguments altogether. The persuader should then present the strongest piece of evidence and ask participants to withhold from making immediate judgements until all of the information has been presented. This will likely induce an effect of primacy such that the desired message when presented first will be more influential For Easterners. For Westerners on the other hand, it seems that the order in which messages are presented is less important, however, according to the pattern of findings from the present research, it would be a good idea to present the strongest piece of information last.

Future Research

The present study provides an important first step in investigating underlying processes that play a role in the relationship between culture and the effects of message order. We took on a belief updating and adjustment framework and examined factors related to culture. We found that cognitive thinking only partially explained the effect of culture on order effects. It is possible that factors other than holistic and analytic thinking are also at work. Further avenues could explore additional factors that elucidate how culture is related the primacy and recency effect and opinion change. For example, future research can explore the role of communication styles in terms of high vs. low context communication (the extent to which people pay attention to the context of the message) to investigate how sensitivity to the context may affect order effects. When opposing occurrences do arise, such as the case in when one encounters series of pro/con

arguments, a high-context individual will be more prone to harmonize the two. Conversely, with a focus on the uniqueness of the self and independence, an individualistic low-context person will likely view positive and negative aspects as mutually exclusive, thus focusing on either of the two aspects, and not accepting both as compatible.

Further, future studies that collect participants' cognitive responses will benefit our understanding of the interplay between cognitive style and order effects. One method involves having participants list their thoughts as they evaluate different sides of the argument. Evidence for the effect of holistic or analytical thinking can be discerned by observing the pattern of thoughts gathered after every piece of evidence has been presented in the SbS mode and examine how participants' opinions evolve. For participants in the EoS mode, this method also allows researchers to collect information on whether participants focus on the most recent set of arguments, or focus on all the arguments presented as a whole when making the final decision (Haugtvedt, 1994).

Lastly, we engage in influence and persuasion attempts in our daily life in a variety of ways. Thus, it would be fruitful to extend the present area of research into other areas such as employment decision making and negotiation research. Future research can make use of richer and more complex stimuli to provide further tests of the Belief-Adjustment Model and examine ways to limit the influence of order effects. In addition to testing the model, research should address the question of whether or not both types of response modes are more susceptible to judgement and decision bias errors; this can be done by setting a criterion to assess which mode leads to more accurate ratings. This topic is of special relevance to the interview literature, for example, perhaps employing a structured interview format will promote one to take on a SbS process of response mode that promotes the recency effect when making evaluations of the

candidate after every question has been answered. Alternatively, if decision makers withhold all judgements until all information has been presented, they may become more prone to the primacy effects. As an important next step, it would be worthwhile to examine these judgement errors in different cultural context that can help reduce the occurrence of potential judgement biases.

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